



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/581,500

06/02/2006

Masuaki Okada

YANE-0004-US1

3844

22506 7590 06/16/2008

JAGTIANI + GUTTAG
10363-A DEMOCRACY LANE
FAIRFAX, VA 22030

EXAMINER

GOFF II, JOHN L

ART UNIT

PAPER NUMBER

1791

MAIL DATE

DELIVERY MODE

06/16/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/581,500	Applicant(s) OKADA, MASUAKI	
	Examiner John L. Goff	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-7,12,14-20,22-26,28-34 and 36-39 is/are pending in the application.
- 4a) Of the above claim(s) 9-11,13,19,20,22-26,28-34 and 36-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-7,12 and 14-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the amendment filed on 2/26/08.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3-7, 12, and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagakubo et al. (U.S. Patent 5,421,953).

Nagakubo discloses a method for bonding objects comprising subjecting bonding surfaces of the objects to a physical treatment step using an ionized gas, e.g. argon, having a strong ion strike force thereby etching surfaces of the objects to be bonded, subjecting bonding surfaces of the objects to a chemical treatment step using active ions having a weak ion strike force via a plasma treatment step using a reaction gas containing oxygen so that OH groups are attached to the bonding surfaces of both of the objects, and bonding both of the objects together via the bonding surfaces (Figures 2, 3, and 7 and Column 2, lines 54-68 and Column 3, lines 1-3, 34-35, and 47-62 and Column 5, lines 66-68 and Column 6, lines 1-17 and 37-68 and Column 7, lines 1-23).

Nagakubo teaches the objects without water therebetween may be bonded together at room temperature without heating (Column 2, lines 19-22) considered “bonded together in a solid phase at 500 °C or less”.

Nagakubo teaches a physical treatment and chemical treatment step substantially the same as that claimed including a specific disclosure of the bonding surfaces receiving water such that Nagakubo is considered to include “a surface activation step of performing said hydrophilic treatment by means of a plasma treatment means for changing an ion strike force”.

Nagakubo teaches the physical treatment step includes an ionized gas, e.g. argon, having a strong ion strike force such that because plasma is known to one of ordinary skill in the art as a highly ionized gas, e.g. see the American Heritage Dictionary definition of plasma as evidence, Nagakubo is considered to teach “a physical treatment step of subjecting both said objects to be bonded to a physical treatment using said plasma having a strong ion strike force”.

Regarding claims 4 and 7, Nagakubo teaches the method for bonding occurs while applying vacuum in a chamber (Column 5, lines 49-51) considered to include “after said physical treatment step, evacuation is performed before said chemical treatment step” and “wherein said physical treatment step and said chemical treatment step are performed without exposure to atmospheric air”.

Regarding claim 5, Nagakubo teaches the reaction gas may include hydrogen (Column 6, lines 50-51).

Regarding claim 12, Nagakubo teaches a plasma treatment means for changing the ion strike force comprising a first low-pressure emitting means (21 of Figure 3) and a second low-pressure emitting means (32 of Figure 3) each of which are considered to emit a low-pressure

Art Unit: 1791

plasma having a different ion strike force and means for switching between the first and second low-pressure plasma emitting means is considered inherent for performing a physical treatment step separate from a chemical treatment step. The first low-pressure emitting means is considered to inherently include a power supply and the holder through which an electric current passes (12 and 50 of Figure 3) taught by Nagakubo is considered an object-to-be-bonded holding electrode. The second low-pressure emitting means traps plasma ions generated in another room (32 of Figure 3) and emits radicals.

Regarding claim 16, Nagakubo teaches a voltage may be applied between both objects to be bonded to remove any water and form a firm bond (Column 10, lines 9-17) considered so that said objects to be bonded are bonded together in a solid phase wherein Nagakubo further teach heat may be applied during bonding (Column 11, lines 1-4).

Regarding claims 17 and 18, Nagakubo teaches at least one of the objects to be bonded is a wafer (13 or 14 of Figure 3) made of SiO₂ (Column 5, line 29).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1791

5. Claims 1, 3-7, 12, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagakubo in view of Xu et al. (U.S. Patent 6,749,729) or Vasudev et al. (U.S. Patent 5,418,095).

As noted above, Nagakubo teaches the physical treatment step includes an ionized gas, e.g. argon, having a strong ion strike force such that because plasma is known as a highly ionized gas, e.g. see the American Heritage Dictionary definition of plasma as evidence, Nagakubo is considered to teach “a physical treatment step of subjecting both said objects to be bonded to a physical treatment using said plasma having a strong ion strike force”. In the event it is shown the ion etching/sputter etching with ionized argon taught by Nagakubo is not necessarily plasma the following rejection would apply, it being noted Nagakubo is not limited to ion etching/sputter etching with any particular means. It is considered well known in the art that ion etching/sputter etching with ionized argon is performed using a plasma treatment source as shown by Xu (Column 3, lines 1-2) or Vasudev (Column 4, lines 53-54). It would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the ion etching/sputter etching with ionized argon taught by Nagakubo using a plasma treatment source as was a well known suitable means as shown by Xu or Vasudev.

Regarding claim 16, in the event it is shown Nagakubo does not necessarily suggest applying a voltage and heating during bonding in combination the following rejection would apply. It would have been obvious to one of ordinary skill in the art to include in Nagakubo (or Nagakubo as modified by Xu or Vasudev) a step of both applying a voltage and heating during bonding as both were suggested by Nagakubo for removing any water between the objects and to form a firm bond.

Art Unit: 1791

6. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagakubo (or Nagakubo and Xu or Vasudev) as applied to claims 1, 3-7, 12, and 16-18 above, and further in view of Goel et al. (U.S. Patent 6,486,597) and Kobayashi et al. (U.S. Patent 6,512,562).

Nagakubo (or Nagakubo and Xu or Vasudev) as applied above teaches all of the limitations in claims 14 and 15 except for a specific teaching of including oxygen gas with the argon gas in the physical treatment step and including nitrogen gas with the oxygen gas in the chemical treatment step, it being noted Nagakubo is not limited to any particular gases for either step. It was known in argon ion etching to include oxygen gas to improve the efficiency and adhesive properties as shown by Goel (Column 6, lines 59-65), and further it was known to include in a reaction gas for a chemical treatment step of forming hydroxyl groups to include nitrogen gas, oxygen gas, hydrogen gas, etc. to improve the adhesive properties as shown by Kobayashi (Column 8, lines 20-34). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include oxygen gas in the physical treatment step and nitrogen gas in the chemical treatment step taught by Nagakubo (or Nagakubo as modified by Xu or Vasudev) for reasons such as improving the efficiency of the step and adhesive properties as shown by Goel and Kobayashi.

Response to Arguments

7. Applicant's arguments with respect to claims 1, 3-7, 12, and 14-18 have been considered but are moot in view of the new ground(s) of rejection.

The previous rejections over Nagakubo et al. (U.S. Patent 5,904,860) are withdrawn in view of applicants amendment.

Applicant argues, "Contrary to the requirement of 37 CFR 1.104(b) that "the examiner's action will be complete as to all matters," nowhere does the Office Action indicate what the status is of pending Claims 19 through 20, 22 through 26, 31, 33 through 34, and 36 through 39. For example, the Office Action does not say that Claims 19 through 20, 22 through 26, 31, 33 through 34, and 36 through 39 have been withdrawn from consideration."

As noted by applicant "Applicant notes the Examiner's acknowledgment of the acceptance of the response filed on October 1, 2007 where Applicant elected group I, drawn to pending Claims 1, 3 through 7, and 14 through 18." and "Applicant further notes the Examiner's acknowledgment of the acceptance of the response filed on October 24, 2007 where: (1) Applicant elected species D drawn to pending Claims 1, 3 through 7, 14 through 20, 22 through 26, 31, 33 through 34 and 36 through 39; and the Examiner has withdrawn from consideration Claims 9 through 11, 13, 28 through 30 and 32.". Thus, claims 1, 3-7, 12, and 14-18 are the elected claims drawn to Group I and Species D. As claim 19 is drawn to non-elected Group II (See the restriction requirement mailed 9/11/07) and claims 20, 22-26, 28-34, and 36-39 are drawn to non-elected Group III (See the restriction requirement mailed 9/11/07), claims 19, 20, 22-26, 28-34, and 36-39 are withdrawn from consideration.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is **(571) 272-1216**. The examiner can normally be reached on M-F (7:15 AM - 3:45 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1791

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John L. Goff/
Primary Examiner, Art Unit 1791